Amendments to the Claims

This listing of claims will replace all prior versions, and listings, of claims in the application.

All claims currently being amended are shown with deleted text struckthrough or double bracketed and new text underlined. Additionally, the status of each claim is indicated in parenthetical expression following the claim number.

1. (Original) A method for functionalizing single-wall carbon nanotubes comprising the steps of:

   a) fluorinating single-wall carbon nanotubes to form fluoronanotubes; and

   b) reacting the fluoronanotubes with a species comprising at least one amine functionality to provide single-wall carbon nanotubes functionalized through carbon-nitrogen covalent bonds to their sidewalls.

2. (Original) The method of Claim 1, wherein the single-wall carbon nanotubes comprise diameters that range from about 0.5 nm to about 2.0 nm.

3. (Original) The method of Claim 1, wherein the single-wall carbon nanotubes comprise lengths that range from about 10 nm to about 300 μm.

4. (Original) The method of Claim 1, wherein the single-wall carbon nanotubes are selected from the group consisting of metallic, semiconducting, semimetallic, and combinations thereof.

5. (Original) The method of Claim 1, wherein the step of fluorinating single-wall carbon nanotubes is a direct fluorination.

6. (Original) The method of Claim 1, wherein the fluoronanotubes comprise a stoichiometry CF_n, where n ranges from about 0.1 to about 0.5.

7. (Original) The method of Claim 1, wherein the species comprising at least one amine functionality comprises the general formula N(R)(R')R'', where R, R', and R'' are each selected from the group consisting of –H, alkyl, aryl, hydroxyalkyl, aminoalkyl, thioalkyl, and combinations thereof.

8. (Original) The method of Claim 7, wherein R, R', and R'' are all the same.

9. (Original) The method of Claim 7, wherein R, R', and R'' are not all the same.

10. (Original) The method of Claim 1, wherein the step of reacting comprises the use of a catalyst selected from the group consisting of pyridine, triethylamine, and combinations thereof.

11. (Original) The method of Claim 1, wherein the step of reacting comprises a reaction temperature that ranges from about 70°C to about 170°C.

12. (Original) The method of Claim 1, wherein the step of reacting comprises an inert atomosphere selected from the group consisting of nitrogen, argon, helium, and combinations thereof.

13. (Original) The method of Claim 1, further comprising post-reaction processing steps selected from the group consisting of centrifugation, decanting, filtration, washing, drying, and combinations thereof.

14. (Original) The method of Claim 1, wherein the species comprising at least one amine functionality is a diamine comprising the general formula $H_2N\text{-}(CH_2)_n\text{-}NH_2$, wherein n is an integer that ranges from 1 to about 20.

15. (Original) The method of Claim 14, further comprising a step of reacting the single-wall carbon nanotubes functionalized through carbon-nitrogen covalent bonds to their sidewalls with a species capable of undergoing a polycondensation reaction.

16. (Original) The method of Claim 14, further comprising a step of reacting the single-wall carbon nanotubes functionalized through carbon-nitrogen covalent bonds to their sidewalls with adipoyl chloride to form a nylon-nanotube polymer material.

17. (Original) A method for functionalizing single-wall carbon nanotubes comprising the steps of:

a) fluorinating single-wall carbon nanotubes to form fluoronanotubes;

b) reacting the fluoronanotubes with Li_3N to form an intermediate species, SWNT-$[NLi_2]_x$; and

c) reacting the intermediate species, SWNT-$[NLi_2]_x$, with a halide-containing species, R-X, to provide single-wall carbon nanotubes functionalized through carbon-nitrogen covalent bonds to their sidewalls.

18. (Original) The method of Claim 17, wherein the single-wall carbon nanotubes comprise diameters that range from about 0.5 nm to about 2.0 nm.

19. (Original) The method of Claim 17, wherein the single-wall carbon nanotubes comprise lengths that range from about 10 nm to about 300 μm.

20. (Original) The method of Claim 17, wherein the single-wall carbon nanotubes are selected from the group consisting of metallic, semiconducting, semimetallic, and combinations thereof.

21. (Original) The method of Claim 17, wherein the step of fluorinating single-wall carbon nanotubes is a direct fluorination.

22. (Original) The method of Claim 17, wherein the fluoronanotubes comprise a stoichiometry CF_n, where n ranges from about 0.1 to about 0.5.

23. (Original) The method of Claim 17, wherein the step of reacting the fluoronanotubes with Li_3N comprises a first reaction temperature which ranges from about 90°C to about 120°C.

24. (Original) The method of Claim 17, wherein the step of reacting the fluoronanotubes with Li_3N comprises a first reaction duration that ranges from about 2 hours to about 3 hours.

25. (Original) The method of Claim 17, wherein the step of reacting the fluoronanotubes with Li_3N comprises an inert atomosphere selected from the group consisting of nitrogen, argon, helium, and combinations thereof.

26. (Original) The method of Claim 17, wherein the step of reacting the intermediate species, SWNT-$[NLi_2]_x$, with a halide-containing species, R-X, comprises an inert atmosphere selected from the group consisting of nitrogen, argon, helium, and combinations thereof.

27. (Original) The method of Claim 17, wherein the step of reacting the intermediate species, SWNT-$[NLi_2]_x$, with a halide-containing species, R-X, comprises a second reaction temperature which ranges from about 25°C to about 70°C.

28. (Original) The method of Claim 17, wherein the step of reacting the intermediate species, SWNT-$[NLi_2]_x$, with a halide-containing species, R-X, comprises a second reaction duration that ranges from about 1 hour to about 2 hours.

29. (Original) The method of Claim 17, further comprising post-reaction processing steps selected from the group consisting of centrifugation, decanting, filtration, washing, drying, and combinations thereof.

30. (Original) The method of Claim 17, wherein the halide-containing species comprises the general formula R-X, where R is selected from the group consisting of –H, alkyl, aryl, substituted alkyl, substituted aryl, and combinations thereof, and X is selected from the group consisting of –F, -Cl, -Br, -I, and combinations thereof.

31. (Original) Functionalized single-wall carbon nanotubes, of the general formula SWNT-$[N(R)R']_x$, wherein substituent groups, -$[N(R)R']_x$, are bound to the single-wall carbon nanotubes through carbon-nitrogen covalent bonds to their sidewalls.

32. (Original) The functionalized single-wall carbon nanotubes of Claim 31, wherein R and R' are each selected from the group consisting of –H, alkyl, aryl, substituted alkyl, aubstituted aryl, alkoxy, hydroxyalkyl, and combinations thereof.

33. (Original) The functionalized single-wall carbon nanotubes of Claim 31, wherein R is –H.

34. (Original) The functionalized single-wall carbon nanotubes of Claim 31, wherein the number of substituent groups per nanotube carbon ranges from about 0.01 to about 0.25.

35. (Original) The functionalized single-wall carbon nanotubes of Claim 31, wherein said functionalized single-wall carbon nanotubes possess superior solubility in solvents selected from the group consisting of primary amines, alcohols, water, dilute acids, and combinations thereof, relative to non-functionalized single-wall carbon nanotubes.

36. (Original) The functionalized single-wall carbon nanotubes of Claim 31 used as precursors for chemical reactions.

37-38. (Cancelled)

39. (New) The functionalized single-wall carbon nanotubes of Claim 36, wherein the functionalized single-wall carbon nanotubes have been reacted with adipoyl chloride so as to form a nylon-nanotube material comprising the functionalized single-wall carbon nanotubes.